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Panic disorder in later life: results from a national survey of Canadians

Laurie M. Corna,[1] John Cairney,[1, 2, 3] Nathan Herrmann,[4] Scott Veldhuizen,[2] Laura McCabe[4] and David Streiner[5]

[1] *Department of Public Health Sciences, University of Toronto, Canada*
[2] *Health Systems Research and Consulting Unit, Centre for Addiction and Mental Health, Toronto, Canada*
[3] *Department of Psychiatry, University of Toronto, Canada*
[4] *Sunnybrook and Women's College Health Sciences Centre, Department of Psychiatry, University of Toronto, Canada*
[5] *Baycrest Centre for Geriatric Care, Department of Psychiatry, University of Toronto, Canada*

ABSTRACT

Background: At present, our understanding of the risk markers associated with panic disorder among older, community dwelling older adults is limited. To address this gap, we examined the prevalence, risk markers, and comorbidity of panic disorder defined using DSM-IV criteria among older adults.

Method: Using data drawn from a large, nationally representative sample of Canadians, we estimated lifetime and 12-month prevalence of panic disorder, and examined demographic predictors and patterns of comorbidity of current panic disorder in adults aged 55 years and older (n = 12,792).

Results: The 12-month and lifetime prevalence estimates of panic disorder in this sample were 0.82% and 2.45% respectively, and one-fifth of these cases reported a first onset after the age of 55 years. In multivariate models, the risk of panic disorder decreased with older age and was significantly lower among widowed respondents. Physical limitations in daily activities as well as the presence of other psychiatric disorders (major depression, and social phobia) were also significantly associated with panic disorder in this sample.

Conclusions: Consistent with previous research on panic disorder, the prevalence of the disorder decreased with age among older adults. Potential explanations for the age effect and the clinical implications of the mental health comorbidities with panic disorder are discussed.

Key words: anxiety disorder, epidemiology, older adults

Correspondence should be addressed to: Laurie M. Corna, Health Systems Research and Consulting Unit, Centre for Addiction and Mental Health, 33 Russell St., Toronto, ON, M5S 2S1, Canada. Phone: +1 416 535 8501; Fax: +1 416 979 4703. Email: laurie.corna@utoronto.ca. Received 31 Jul 2006; revision requested 1 Nov 2006; revised version received 2 Jan 2007; accepted 8 Jan 2007. First published online 19 March 2007.

Introduction

Anxiety disorders, including panic, are among the most common psychiatric problems in older populations (Hybels and Blazer, 2002) and are a source of disability in overall mental and role functioning (Horwath *et al.*, 2002). Panic disorder (PD) is characterized by recurrent, unexpected panic attacks, followed by at least one month of persistent concern about having another attack, concern about the implications of the panic attacks, or a significant change in behavior that is directly related to the attacks (American Psychiatric Association, 2000). Definitions of panic disorder have changed somewhat in recent decades. The primacy of agoraphobia and PD, where they occur together, was reversed in DSM-IIIR ("agoraphobia with panic attacks" in DSM-III was replaced by "panic disorder with agoraphobia"), and the requirement of a minimum frequency of panic attacks (three attacks in three weeks in DSM-III, four in four weeks in DSM-IIIR) was removed in DSM-IV. The list of potential symptoms was also expanded in DSM-IIIR to include nausea or abdominal distress (Horwath *et al.*, 2002).

At present, there are limited data on the prevalence of 12-month and lifetime PD using DSM-IV criteria among older adults. Published estimates of 12-month PD in the general adult population range from 0.7% to 2.3%, and 6-month prevalence estimates from 0.6% to 1.0% (Myers *et al.*, 1984; Bland *et al.*, 1988a; Kessler *et al.*, 1994). A number of studies have excluded older adults altogether or not provided prevalence estimates by age group (Eaton *et al.*, 1994; Kessler *et al.*, 1994; Carlbring *et al.*, 2002; Goodwin *et al.*, 2005). Using DSM-III criteria, Beekman *et al.* (1998) reported 12-month estimates for the youngest (55–64 years: 0.8%), middle (65–74 years: 1.7%) and oldest old (75–85 years: 0.5%) in their survey of adults from the Netherlands. Six-month and lifetime estimates of 0.3% and 1.2% respectively, were reported in a sample of adults aged 65 years and older in Edmonton, Canada (Bland *et al.*, 1988b). Estimates from the ECA study sites using DSM-III criteria reported six-month prevalences of PD of 0.1% to 0.4% among adults aged 65 years and older (Myers *et al.*, 1984). Finally, using DSM-IV criteria, Kessler *et al.* (2005) estimated lifetime prevalence for adults aged 60 and older at 2.0%, but did not provide estimates for any shorter time periods.

With regard to social and demographic risk markers, the prevalence of PD is frequently higher among females in population samples (Flint, 1994; Weissman *et al.*, 1997; Beekman *et al.*, 1998; Carlbring *et al.*, 2002; Horwath *et al.*, 2002). While some studies indicate that low education and low income are risk markers for PD or anxiety disorders in general (Eaton *et al.*, 1994; Beekman *et al.*, 1998), many studies have not assessed measures of socioeconomic position as predictors of PD (Wittchen and Essau, 1993). Finally, PD is associated with a number of other psychiatric disorders, including agoraphobia and depression (Beekman *et al.*, 2000; Goodwin *et al.*, 2005). However, our present understanding of these and other potential risk markers in later life is limited because many epidemiological studies either do not examine a full range of sociodemographic variables (Eaton *et al.*, 1994; Offord *et al.*, 1996) or, as we have noted, exclude older adults altogether.

To our knowledge, there is no published work that assesses the prevalence and risk markers of both 12-month and lifetime PD using DSM-IV criteria in a large, general population sample of older adults. There are a number of reasons for undertaking such an investigation. First, providing measures of prevalence that reflect current or recent disorder is important because lifetime estimates do not necessarily measure the current burden of illness among older adults. Second, there is some evidence that the prevalence of current PD declines with age (Bland *et al.*, 1988b; Krasucki *et al.*, 1998), but this has not been confirmed using DSM-IV criteria. Third, given the changes in the diagnostic criteria between DSM-III and DSM-IV, contemporary data are necessary to assess the prevalence of PD as it is currently understood. Finally, the paucity of data on risk markers related to PD in later life needs to be redressed. Since previous epidemiological work has not consistently examined a full range of sociodemographic risk markers for PD, our understanding of the social distribution of the disorder among older adults is limited. This is important for understanding whether PD differentially burdens some groups of older adults more than others.

Method

The data come from the Canadian Community Health Survey – Mental Health and Well-being (CCHS 1.2), a nationally representative community mental health survey conducted by Statistics Canada (the national statistical agency) between May and December 2002 (Gravel and Béland, 2005). In this investigation, we focused on respondents aged 55 and older (n = 12,792). Following a listwise deletion of cases with missing values, the resulting sample used in all analyses reported here was n = 10,690.

The decision to choose age 55 rather than the more traditional cut-off point of 65 was made for a number of reasons. First, many recent, large-scale surveys of psychiatric disorders in the general population exclude individuals over the age of 54 and we wanted to capture that segment of the population that is often excluded in these surveys. Second, as individuals increasingly elect to retire earlier than 65 or to stay in the labour force well past this age, the use of 65 to define entry to "old age" is becoming much less relevant. Third, since 55 years of age has been used before as the lower bound to define old age (e.g. Beekman *et al.*, 2000), this work will be comparable with other studies in the field. Finally, it was necessary to use a broader age range to ensure that enough positive cases of PD were available for analysis.

Twelve-month and lifetime prevalence of panic disorder

In the CCHS 1.2, the presence or absence of five common psychiatric disorders (major depressive episodes, manic episodes, agoraphobia, social phobia, and panic disorder) was ascertained with a set of diagnostic interviews based on the World Mental Health Composite International Diagnostic Interview (WMH-CIDI) administered by trained lay interviewers (Kessler *et al.*, 1994; Kessler *et al.*, 2004). For individuals to be screened into the PD module, a positive

response was required to either of the following two questions: "During your life, have you ever had an attack of fear or panic when all of a sudden you felt very frightened, anxious or uneasy?"; and "Have you ever had an attack when all of a sudden, you became very uncomfortable, you either became short of breath, dizzy, nauseous or your heart pounded, or you thought that you might lose control, die or go crazy?". Following DSM-IV, the diagnostic module then determined lifetime caseness according to the following criteria: a respondent (1) reported four or more unexpected panic attacks; and (2) reported that at least one of the attacks was followed by one month or more of worry about the attacks or significant changes in behavior related to the attacks. Respondents were positive for 12-month disorder if they (1) met the criteria for lifetime PD; (2) had a panic attack in the 12 months prior to the interview; and (3) experienced significant emotional distress during a panic attack over the same period.

Psychiatric and physical health comorbidities

PD is found to be frequently comorbid with other physical and psychiatric conditions, including affective, anxiety, and substance use disorders (Beekman *et al.*, 2000; Birchall *et al.*, 2000; Goodwin *et al.*, 2005). For this reason, we included 12-month major depression, social phobia, mania, and agoraphobia in this analysis; there were not enough cases of substance use disorders to include this variable. Respondents were also asked if they had ever been diagnosed by a physician with any of 22 chronic health conditions (e.g. asthma, diabetes, epilepsy, heart disease, cancer) and whether they required assistance with activities of daily living (e.g. personal care, grocery shopping) and instrumental activities of daily living. For example, respondents were asked "Do you have diabetes diagnosed by a health professional?" and "Do you require assistance with meal preparation?" We created a dummy variable to identify respondents who reported one or more chronic health conditions and another to identify respondents who reported one or more limitations in activities of daily living. These variables were coded as the presence or absence of any chronic conditions or limitations in daily activities because of the highly skewed distribution of the responses.

Sociodemographic risk markers

Several sociodemographic risk markers were selected based on previous work on PD in the general population (Eaton *et al.*, 1994; Kessler *et al.*, 1994; Wang *et al.*, 2000; Carlbring *et al.*, 2002; Goodwin *et al.*, 2005). These included age, sex, marital status, education, income adequacy and language spoken (defined here as the first language learned and still understood). Income adequacy is a measure of economic status that accounts for the number of household residents. Low-income adequacy is defined as a household income of <$15,000 for 1–2 residents, <$20,000 for 3–4 residents, or <$30,000 for 5+ residents; middle-income adequacy as income <$30,000 for 1–2 residents, <$40,000 for 3–4 residents and <$60,000 for 5+ residents. Education was divided into three categories: less than high school, high school completed, and at least some

post-secondary education. Language spoken was analyzed by creating three language categories: English only, French only, and other, the last including both bilingual respondents and those speaking a third language. While it would have been preferable to consider respondents not speaking an official language separately, this was precluded by sample size limitations. Marital status categories included married (reference category), single (never married), divorced or separated, and widowed. Age was kept as a continuous variable and in these analyses, females were compared to males.

Statistical analysis

In the first part of the analysis, we calculated 12-month and lifetime estimates of PD in the total sample and by age groups (55 to 64, 65 to 74; 75+). To obtain independent associations between risk markers and 12-month PD, we used logistic regression. We first reported unadjusted ORs for each of the predicted risk markers, then fit two additional models, the first adjusting for socioeconomic and demographic variables and the second incorporating measures of psychiatric and physical comorbidity.

CCHS 1.2 used a multistage, stratified cluster design to select eligible households. To correct the potential bias resulting from this complex survey design, Statistics Canada recommends bootstrapping of all tests using a set of replicate weights that they supply. All results presented here were produced with this approach. STATA 8.0 was used to bootstrap all results. Data for this study were obtained from the CCHS 1.2 Master File maintained at the Statistics Canada Research Data Centre, Toronto, Canada.

Results

Sample characteristics are presented in Table 1. Twelve-month and lifetime prevalence estimates among adults 55 and older were 0.82% (95% CI = 0.65–0.99) and 2.45% (95% CI = 2.16–2.74) respectively (Table 2) and 23% of respondents with PD reported onset after the age of 55. Comorbid mood and anxiety disorders were common in this population, with 39% of respondents with 12-month panic disorder also meeting criteria for at least one of the other disorders assessed over the same period. Depression was most prevalent, at 27.5% (95% CI = 20.26–42.74), followed by social phobia (19.1%, 95% CI = 9.6–28.6) and agoraphobia (6.2%, 95% CI = 0.4–2.1%).

The unadjusted ORs for potential risk markers are presented in the first column of Table 3. The odds of reporting PD decreased with age and were lower among widowed respondents and those speaking either both or neither official language. Adjusted ORs are presented in the second column of Table 3. One notable difference among the adjusted ORs was that low-income respondents reported nearly a four-fold risk of being diagnosed with PD compared to those in the high-income group. When the odds ratios were further adjusted for psychiatric and physical health comorbidity (column 3 in Table 3), we observed strong associations between 12-month PD and 12-month major depression,

Table 1. Sample characteristics (N = 10,690)

	N	PERCENTAGE OR MEAN (SD)
Gender (female = 1)	5484	51
Marital status		
Married	7417	69
Never married	1858	17
Widowed	896	8
Separated/divorced	518	5
Income adequacy		
Low income	1295	13
Middle income	3057	29
High income	6338	59
Education		
< Secondary diploma	4159	39
Secondary diploma	1788	17
Post-secondary	4743	44
Language		
English only	5784	54
French only	2758	26
Both or other	2148	20
Any chronic conditions	7748	72
Any limitations in daily activities	2691	25
Respondent age	10690	66.83 (9.0)

social phobia, and mania. Reporting any limitations in daily activities was also associated with increased odds of reporting PD, while the effect of chronic health problems was not significant. Following adjustment for other physical and mental health problems in this model, the effect of being in the low-income group was no longer significant, although having a secondary school diploma was significantly associated with an increased risk of PD relative to those in the highest education group. In both the unadjusted and adjusted analyses, gender was not significantly associated with PD in this population.

Discussion

With nearly 1% of older adults qualifying for a diagnosis of PD, and its potential to influence mental well-being and role function among older adults, investigation into the distribution of the disorder and its associated risk markers is important. Direct comparison of our findings with other contemporary data is problematic for the reasons outlined in the beginning of the paper. Nonetheless, our 12-month estimate of 0.82% is consistent with DSM-III estimates of between 0.6 and 1.0%. However, our lifetime prevalence estimate of 2.45% was slightly higher than the 2% for this same time period reported by Kessler *et al.* (2005)

Table 2. Twelve-month and lifetime prevalence estimates of PD in a sample of adults aged 55 and over

AGE GROUPS	12-MONTH PREVALENCE (95% CI) n	LIFETIME PREVALENCE (95% CI) n
55 to 64	1.3%	3.5%
(n = 5048)	(0.96–1.63)	(2.9–4.0)
	65.3	176.7
65 to 74	0.32%	1.7%
(n = 3366)	(0.13–0.51)	(1.3–2.2)
	10.8	57.2
75 and over	0.50%	1.1%
(n = 2276)	(0.24–0.75)	(0.7–1.5)
	11.3	25.0
All respondents 55+ years	0.82%	2.45%
(n = 10690)	(0.65–0.99)	(2.16–2.74)
	87.4	261.9
All respondents < 55 years	1.80	4.54
(n = 14379)	(1.59–2.02)	(4.20–4.89)
	258	652
Full CCHS 1.2 Sample [all ages]	1.46	3.82
(n = 25069)	(1.31–1.61)	(3.58–4.06)
	366	957

using DSM-IV criteria for adults aged 60 years and older. Since the measure used to assess PD in this sample is the same as that employed by Kessler and his colleagues, it is doubtful that the difference in lifetime prevalence is the result of measurement. Whether our higher estimate is due to differences between populations requires further investigation.

With respect to risk markers associated with PD, consistent with previous work, we found that younger respondents were more likely to report PD (Regier *et al.*, 1988). In contrast to previous work with samples of older adults (Myers *et al.*, 1984; Bland *et al.*, 1988a), however, the prevalence of PD was not higher among women than men. It is noteworthy that one study (Bland *et al.*, 1988a) that did find a higher prevalence of PD among older women did not include a test of the statistical significance of this difference. Gender differences have been reported more consistently among young adults (Carlbring *et al.*, 2002), however; it may be that these diminish with age. While low income was associated with a four-fold increase in likelihood of PD in Model 2, this effect was reduced and became non-significant when comorbid psychiatric conditions were included. This suggests that low income is a risk marker for multiple psychiatric disorders, and that this effect partially mediates its association with PD specifically.

Relative to those currently married, widowed respondents had a lower likelihood of PD, while differences for single and separated or divorced

Table 3. Unadjusted and Adjusted Logistic Regression of 12-Month Panic Disorder on Risk Markers, Physical Health and Psychiatric Comorbidities in a sample of adults aged 55 and over (N = 10690)

VARIABLES	UNADJUSTED OR (95% CI)	ADJUSTED OR[1] (95% CI)	ADJUSTED OR[2] (95% CI)
Age	0.93** (0.89–0.97)	0.94** (0.90–0.98)	0.93** (0.89–0.98)
Sex			
Female	0.92 (0.46–1.84)	0.90 (0.45–1.82)	0.77 (0.35–1.69)
Male	–	–	–
Marital status			
Widowed	0.27** (0.10–0.97)	0.34* (0.11–0.99)	0.18* (0.04–0.71)
Divorced/separated	1.34 (0.64–2.83)	0.81 (0.33–1.98)	0.50 (0.17–1.53)
Never married	0.40 (0.06–2.92)	0.27 (0.04–1.98)	0.26 (0.03–2.37)
Married	–	–	–
Income adequacy			
Low	1.90 (0.76–4.77)	3.94* (1.38–11.22)	2.94 (0.92–9.49)
Medium	0.93 (0.41–2.10)	1.60 (0.70–3.65)	1.31 (0.53–3.24)
High	–	–	–
Education			
< Secondary	1.08 (0.46–2.55)	1.21 (0.51–2.85)	1.34 (0.53–3.40)
Secondary	2.63 (1.04–6.63)	2.48 (0.97–6.34)	2.61* (1.01–6.78)
Post-secondary	–	–	–
First language spoken and still understood			
English	–	–	–
French	0.63 (0.25–1.60)	0.59 (0.25–1.40)	0.69 (0.28–1.72)
Both or other	0.07*** (0.02–0.29)	0.07*** (0.02–0.29)	0.09** (0.02–2.41)
Geographic location of residence			
Urban	1.81 (0.23–1.33)	0.74 (0.32–1.68)	0.55 (0.23–1.33)
Rural	–	–	–
Any chronic health problems	1.53 (0.55–4.27)		0.92 (0.32–3.67)
Any limitations in ADLs/IADLS	4.82*** (2.49–9.31)		7.80*** (3.39–17.98)

Table 3. (*Cont.*)

VARIABLES	UNADJUSTED OR (95% CI)	ADJUSTED OR[1] (95% CI)	ADJUSTED OR[2] (95% CI)
Other psychiatric disorders			
12-month major depression	19.33*** (7.76–48.14)		5.42** (1.61–18.27)
12-month social phobia	18.96*** (7.20–49.98)		3.59* (1.05–12.25)
12-month agoraphobia	11.23** (2.05–61.62)		5.88 (0.60–57.15)
12-month mania	55.88*** (6.61–472.09)		12.63* (1.31–121.74)

[1]ORs adjusted for risk markers.
[2]ORs adjusted for risk markers and psychiatric/physical health co morbidity.

respondents were not significant. This finding is somewhat difficult to interpret given the lack of comparative data with this age group. In the general population, rates for most lifetime disorders are highest among widowed and separated or divorced respondents (e.g. Bland *et al.*, 1988b). It is possible that elderly widowed individuals with PD are more likely than their married counterparts to be institutionalized or selected out of the sample. The disorder is associated with substantial impairment, and respondents with PD may be less likely than others to adapt successfully to life without a spouse, particularly considering the substantial impairment associated with the condition. Since few studies have considered marital status as a risk marker for PD in this population, replication of this finding with other data is necessary.

As we have noted, our results indicate that the prevalence of both current (12-month) and lifetime PD declines with increasing age, and here we discuss potential explanations for both prevalence periods in turn. That 12-month estimates are lower in older age groups is consistent with results reported in a number of community surveys dating back at least to the Epidemiologic Catchment Area (ECA) studies of 1980s (Myers *et al.*, 1984; Regier *et al.*, 1988). These results have been the subject of considerable debate (e.g. Hybels and Blazer, 2000). A cohort effect was initially favored – it was argued that, perhaps because of exposure to unique historical life experiences such as World War II and the Great Depression, the older generation of that time had developed superior coping skills and consequently enjoyed superior mental health (a position arguably not entirely consistent with what was known or suspected about the effects of traumatic events at the individual level). However, since age effects in CCHS 1.2 (Streiner *et al.*, 2006) and in the recently released NCS-R data (Kessler *et al.*, 2005) are quite similar to those reported in the ECA, despite the intervening 30 years, it appears that a cohort effect is less likely to be responsible.

Other possible explanations include differences in respondent recall, selection effects due to institutionalization and premature mortality, as well as biological explanations for a genuine decrease in the occurrence of panic attacks with age. Although the failure to recall the occurrence of panic attacks over the recent 12-month period is possible, it is a less compelling explanation given the intensely unpleasant nature of a panic attack and the relatively short recall period. While older adults with PD may be more likely to be institutionalized, and thus not represented in community samples, large numbers of older adults would have to be institutionalized for selection effects to account for the prevalence differences in age. Premature mortality is yet another potential explanation. In particular, PD is associated with cardiovascular events (Alvarenga *et al.*, 2006), and longitudinal studies have indicated that PD is a precursor for cardio-vascular disease, thus reducing the expected lifespan for older adults with PD (Coryell *et al.*, 1986; Kawachi *et al.*, 1994). However, mortality would have to be very high among individuals with PD for this to fully account for the observed decline in prevalence. Finally, biological explanations offer some support for the view that lower prevalence among older adults is due to increased remission or lower incidence. Previous work has demonstrated age-related changes in neurotransmitter system structure and function, which could contribute to the lower rates of panic in older populations. For example, Flint *et al.* (1998) compared the behavioral and cardiovascular effects of a panicogenic agent (CCK-4) in a young and older group of adults (20–35 years and 65 + years) in a double-blind, placebo controlled design. Among the participants who received the CCK-4, the older adults reported significantly fewer symptoms, lower intensity, and shorter duration of symptoms. There were no differences across the age groups among those participants who received the placebo saline solution. It is likely that several of the factors discussed contribute to some degree, and determining the contribution of each will require careful analysis of longitudinal data, with detailed event histories (Flint *et al.*, 1996; Krasucki *et al.*, 1998).

With respect to the observed declines in the lifetime prevalence of PD across successively older age groups, it is likely that recall bias and selection effects are operative here as well. For respondents who experienced panic attacks much earlier in life, accurate recall of the frequency and intensity of these events may be problematic, especially among the oldest in the sample. It may also be the case, however, that we observed lower lifetime prevalence estimates with age because older individuals with a history of PD are simply less likely to be in the sample, either because of institutionalization or because of premature mortality.

As expected, the risk for PD was higher among respondents who also reported depression, social phobia and mania. In particular, the high rate of comorbidity between PD and major depression (27.5%) is noteworthy and consistent with previous work (Beekman *et al.*, 2000). This finding underlines the importance of assessing patients for comorbid disorders. It may be particularly useful to screen for PD in older patients who present with depression, since the latter condition may be more readily detected in this population. Moreover, we found more late-onset (after age 55) cases in this study than is generally reported (Flint, 1994),

although the estimate is still quite low (23%). Late-onset is also commonly associated with depression or medical illness (Flint and Rifat, 1997), further reinforcing the need to screen for PD in patients who present with depression and/or serious chronic health problems. Finally, it is interesting that PD was not significantly associated with agoraphobia in this sample. Typically, PD is thought to be a precursor to agoraphobia. The low prevalence of agoraphobia in these data (McCabe *et al.*, 2006), however, suggests that the association between PD and agoraphobia may be more complex in old age.

Limitations

There are a number of limitations with the present study that merit consideration. Since information was collected from respondents at only one point in time, we cannot establish precedence of risk markers and PD. Data collection also relied on self-report and used lay interviewers to conduct the structured diagnostic interview. Finally, information on some prevalent psychiatric disorders, such as generalized anxiety disorder and dysthymia, was not collected.

It is also important to note that older adults who were included in the survey were all community-dwelling respondents. It may be that older adults with mental health problems are more likely to be institutionalized or less likely to respond to a national survey, thereby underestimating the true prevalence of PD. Moreover, despite our large sample size, the number of respondents classified as having PD was small and this limited our ability to identify significant sociodemographic risk markers. Finally, since the survey was only able to distinguish symptoms caused by a medical illness from panic attacks through self-report, it is possible that physical health (e.g. thyroid, cardiac or hypoglycaemic) complications may have been mistakenly classified as panic attacks or conversely, that the manifestation of certain chronic illnesses may have masked the recognition of panic attacks in the medical encounter.

Despite these limitations, this is the only study to our knowledge that provides contemporary 12-month and lifetime prevalence estimates of PD in a representative sample of community-dwelling older adults and which examines sociodemographic risk markers and patterns of comorbidity associated with PD in this population.

Conflict of interest

None.

Description of authors' roles

L. M. Corna was responsible for the design of the paper, the analysis and the writing of the final manuscript. J. Cairney contributed to the design of the paper and assisted with the writing of the manuscript. N. Herrmann assisted with the interpretation of the results and the writing of the introduction and discussion. S. Veldhuizen assisted with the writing of the introduction and discussion.

D. L. Streiner assisted with the interpretation and writing of the results. L. McCabe assisted with the interpretation of the findings and clinical implications.

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